WHAT IS CLAIMED IS:

1. A REMA objective for imaging an object plane onto an image plane, comprising:

- a condenser portion,
- an intermediate portion, and
- a field lens portion,

wherein said REMA objective has a total of no more than 10 lenses with a combined total of no more than five aspheric lens surfaces, each of said condenser portion, said intermediate portion and said field lens portion containing one to two aspheric lens surfaces.

2. The REMA objective according to claim 1, wherein said condenser portion comprises at least one concave surface that is curved toward said object plane.

3. The REMA objective according to claim 2, wherein for said concave surface the ratio of the radius of curvature to the lens diameter is smaller than 0.65.

4. The REMA objective according to claim 1, wherein said field lens portion comprises a collecting lens and a

divergent lens.

5. The REMA objective according to claim 1, having an image field diameter greater than 80 mm.

6. The REMA objective according to Claim 1, having an image side numerical aperture greater than 0.10.

7. The REMA objective according to Claim 1, wherein a light-conducting value of the REMA objective is defined as a multiplication product of image field diameter and image-side numerical aperture of the REMA objective, and wherein said light-conducting value of the REMA objective is greater than 10 mm.

8. The REMA objective according to Claim 1, wherein an image of a bright/dark edge projected from the object plane onto the image plane has a transition zone where a 5 percent brightness level and a 95 percent brightness level are mutually separated by less than 2 percent of the image field diameter.

9. The REMA objective according to Claim 1, wherein

said lenses comprise a condenser portion, an intermediate portion, and a field lens portion, and wherein the condenser portion is configured as an anterior partial objective with a condenser-portion image plane that lies at infinity and with a diaphragm that lies in said object plane of the REMA objective.

10. The REMA objective according to Claim 1, wherein the REMA objective reproduces a predetermined pupil function with values of sin(i) in the range of ± 10 mrad with deviations of less than ± 1 mrad.

11. The REMA objective according to Claim 1, wherein said intermediate portion and said field lens portion are spaced from each other at a distance that is large enough for a deflecting mirror to be arranged between said intermediate portion and said field lens portion.

12. A REMA objective for imaging an object plane onto an image plane, comprising:

- a condenser portion,
- an intermediate portion, and

- a field lens portion,

wherein said REMA objective has lenses with a total of no more than five aspheric lens surfaces, each of said condenser portion, said intermediate portion and said field lens portion containing one to two aspheric lens surfaces, and wherein a glass path length through said lenses does not exceed 30 percent of a distance between said object plane and said image plane.

13. The REMA objective according to claim 12, wherein said condenser portion comprises at least one concave surface that is curved toward said object plane.

14. The REMA objective according to claim 12, wherein for said concave surface the ratio of the radius of curvature to the lens diameter is smaller than 0.65.

15. The REMA objective according to claim 12, wherein said field lens portion comprises a collecting lens and a divergent lens.

16. The REMA objective according to claim 12, having an image field diameter greater than 80 mm.

17. The REMA objective according to Claim 12, having an image side numerical aperture greater than 0.10.

18. The REMA objective according to Claim 12, wherein a light-conducting value of the REMA objective is defined as a multiplication product of image field diameter and image-side numerical aperture of the REMA objective, and wherein said light-conducting value of the REMA objective is greater than 10 mm.

19. The REMA objective according to Claim 12, comprising at least one optical surface for which the maximum amount of the sine of the angle of incidence of a marginal ray in air ($|\sin(i_{edge})|$) relative to the surface normal exceeds 0.6 times the numerical aperture (NAO) on the object side.

20. The REMA objective according to Claim 12, wherein an image of a bright/dark edge projected from the object plane onto the image plane has a transition zone where a 5 percent brightness level and a 95 percent brightness level are mutually separated by less than 2 percent of the image field diameter.

21. A REMA objective for imaging an object plane onto an image plane, comprising a total of no more than 10 lenses with a combined total of one to five aspheric lens surfaces, said REMA objective having an image-side numerical aperture and an image field with an image field diameter, wherein a light-conducting value of the REMA objective is defined as a multiplication product of the image field diameter and the image-side numerical aperture, wherein said light-conducting value of the REMA objective is greater than 10 mm, and wherein an image of a bright/dark edge projected from the object plane onto the image plane has a transition zone in which a 5 percent brightness level and a 95 percent brightness level are mutually separated by less than 2 percent of the image field diameter.

22. The REMA objective according to Claim 21, wherein said combined total consists of three to four aspheric surfaces.

23. The REMA objective according to Claim 21, wherein a glass path length through said lenses does not exceed 30 percent of the distance between said object plane and said

image plane.

24. The REMA objective according to Claim 21, comprising a partial objective that produces a pupil plane that is corrected with respect to coma.

25. The REMA objective according to Claim 21, comprising a partial objective that comprises at least one concave surface that is curved toward said object plane and at which the ratio of the radius of curvature to the lens diameter is smaller than 0.65.

26. A REMA objective for imaging an object plane onto an image plane, comprising lenses with a combined total of one to five aspheric lens surfaces, said REMA objective having an image-side numerical aperture and an image field with an image field diameter, wherein a light-conducting value of the REMA objective is defined as a multiplication product of the image field diameter and the image-side numerical aperture, wherein said light-conducting value of the REMA objective is greater than 10 mm, wherein an image of a bright/dark edge projected from the object plane onto the image plane has a transition zone in which a 5 percent brightness level and a 95 percent

brightness level are mutually separated by less than 2 percent of the image field diameter, and wherein a glass path length through said lenses does not exceed 30 percent of a distance between said object plane and said image plane.

27. The REMA objective according to Claim 26, wherein said combined total consists of three to four aspheric surfaces.

28. The REMA objective according to Claim 26, comprising a partial objective that comprises at least one concave surface that is curved toward said object plane and at which the ratio of the radius of curvature to the lens diameter is smaller than 0.65.

29. The REMA objective according to Claim 26, wherein the REMA objective reproduces a predetermined pupil function with values of sin(i) in the range of ± 10 mrad with deviations of less than ± 1 mrad.

30. A REMA objective for imaging an object plane onto an image plane, comprising no more than 10 lenses with a combined total of one to five aspheric lens surfaces, said

REMA objective having an image field with an image field diameter greater than 80 mm, wherein the REMA objective has an image-side numerical aperture greater than 0.10, and wherein an image of a bright/dark edge projected from the object plane onto the image plane has a transition zone in which a 5 percent brightness level and a 95 percent brightness level are mutually separated by less than 2 percent of the image field diameter.

31. The REMA objective according to Claim 30, wherein said combined total consists of three to four aspheric surfaces.

32. The REMA objective according to Claim 30, wherein a glass path length through said lenses does not exceed 30 percent of the distance between said object plane and said image plane.

33. The REMA objective according to Claim 30, comprising a partial objective that produces a pupil plane that is corrected with respect to coma.

34. The REMA objective according to Claim 30,

comprising a partial objective that comprises at least one concave surface that is curved toward said object plane and at which the ratio of the radius of curvature to the lens diameter is smaller than 0.65.

35. The REMA objective according to Claim 30, wherein the REMA objective reproduces a predetermined pupil function with values of sin(i) in the range of ± 10 mrad with deviations of less than ± 1 mrad.

36. A REMA objective for imaging an object plane onto an image plane, comprising lenses with a combined total of one to five aspheric lens surfaces, said REMA objective having an image field with an image field diameter greater than 80 mm, wherein the REMA objective has an image-side numerical aperture greater than 0.10, wherein an image of a bright/dark edge projected from the object plane onto the image plane has a transition zone in which a 5 percent brightness level and a 95 percent brightness level are mutually separated by less than 2 percent of the image field diameter, and wherein a glass path length through said lenses does not exceed 30 percent of a distance between said object plane and said image plane.

37. The REMA objective according to Claim 36, wherein said combined total consists of three to four aspheric surfaces.

38. The REMA objective according to Claim 36, comprising a partial objective that produces a pupil plane that is corrected with respect to coma.

39. The REMA objective according to Claim 36, comprising a partial objective that comprises at least one concave surface that is curved toward said object plane and at which the ratio of the radius of curvature to the lens diameter is smaller than 0.65.

40. The REMA objective according to Claim 36, wherein the REMA objective reproduces a predetermined pupil function with values of sin(i) in the range of ± 10 mrad with deviations of less than ± 1 mrad.

41. A microlithography projection apparatus, comprising an illumination system with a REMA objective, and further comprising a projection objective, wherein

- said REMA objective has a total of no more than 10 lenses with a combined total of no more than five aspheric lens surfaces,
- a pupil plane of said REMA objective is imaged in a pupil plane of said projection objective,
- in each point of a reticle plane an incident chief ray of said REMA objective deviates less than 3 mrad from a chief ray of said projection objective.

42. The microlithography projection apparatus according to Claim 41, wherein said combined total consists of three to four aspheric surfaces.

43. A REMA objective for imaging an object plane onto an image plane, comprising a first partial objective arranged between the object plane and an aperture plane, and a second partial objective arranged between the aperture plane and the image plane, wherein

- said first and second partial objectives have a common optical axis,
- chief rays originating from the object field intersect the optical axis in the region of the aperture plane,
- the chief rays have field heights Y_{im} in the image plane,

- a chief ray and an energy-weighted average ray are given for each field height Y_{im}, and
- a maximum angular deviation between chief ray and energy-weighted average ray for all field heights Y_{im} is smaller than 2 mrad.

44. The REMA objective according to claim 43, wherein the maximum angular deviation between chief ray and energy-weighted average ray for all field heights Y_{im} is smaller than 1 mrad.

45. The REMA objective according to claim 43, consisting of eight through twelve lenses with finite focal length.

46. The REMA objective according to claim 43, wherein the first partial objective has three to five lenses.

47. The REMA objective according to claim 43, wherein the second partial objective has five through seven lenses.

48. The REMA objective according to claim 43, having lenses with three through five aspheric surfaces.

49. The REMA objective according to claim 43, having lenses with three through five aspheric surfaces.

50. The REMA objective according to claim 43, wherein each ray bundle which starts from a point within the object field and completely fills the image-side numerical aperture in the image plane produces a spot image within the image field, and the maximum diameter of the spot images is at most 2% of the maximum field height Y_{im}^{max}.

51. A REMA objective for imaging an object plane onto an image plane, comprising:
- a condenser portion,
- an intermediate portion, and
- a field lens portion,
wherein said field lens portion has at least two lenses, at least one of the lenses being a positive lens and at least one of the lenses being a negative lens and wherein said field lens portion contains at least one aspheric surface.

52. The REMA objective according to claim 51, wherein the at least one negative lens has a concave lens surface

facing towards the image plane.

53. The REMA objective according to claim 51, wherein the at least one negative lens is meniscus-shaped.

54. A REMA objective for imaging an object plane onto an image plane, wherein the REMA objective has an image-side working distance of at least 30 mm, said image-side working distance being defined as a free working distance between the image plane and the nearest optical surface of the REMA objective.

55. The REMA objective according to claim 54, wherein the image-side working distance is at least 40 mm.

56. A REMA objective for imaging an object plane onto an image plane, comprising:
- a condenser portion,
- an intermediate portion, and
- a field lens portion,
wherein said intermediate portion comprises one lens with positive optical power and one lens with negative optical power and wherein said intermediate portion contains at least

one aspheric surface..

57. The REMA objective according to claim 56, wherein at least one of said lens with positive optical power and said lens with negative optical power is meniscus-shaped.

58. The REMA objective according to claim 56, wherein said lens with positive optical power and said lens with negative optical power is meniscus-shaped.

59. The REMA objective according to claim 56, wherein said intermediate portion consists of said lens with positive optical power and of said lens with negative optical power.

60. A REMA objective for imaging an object plane onto an image plane, comprising:
- a condenser portion,
- an intermediate portion, and
- a field lens portion,
wherein said intermediate portion and said field lens portion are spaced from each other at a distance that is large enough for a beam splitter to be arranged between said intermediate portion and said field lens portion.

61. The REMA objective according to claim 60, wherein the beamsplitter comprises a polarizing beamsplitter cube.

62. The REMA objective according to claim 60, wherein the polarizing beamsplitter cube has a 45° deflection surface with a coating that reflects substantially all of the light that is polarized perpendicular to the plane of incidence and transmits substantially all of the light that is polarized parallel to the plane of incidence.